

ARLYN PERKEY

FOREST MANAGEMENT UPDATE

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THE ROLE OF SILVICULTURE ON THE PRIVATE NON-INDUSTRIAL FOREST

by
Arlyn W. Perkey

"How my woodlot looks is much more important to me than cutting my trees to get a few dollars."

"I'd sooner leave my trees for the wildlife than cut them for the money."

"Sell my trees? I didn't know I could -- I just never really thought about it."



Do any of these comments sound familiar to you? If you have had much contact with private non-industrial forest owners in recent years, I suspect you have heard comments like these, and many more.

Do such comments scare you? They used to bother me, and if I am honest, they still do a little. As America has urbanized, the objectives of forestland owners seem to have shifted -- at least that is the verbal message we are being given.

When many new landowners think about benefits from their land, they indicate a greater interest in the aesthetic and wildlife resources than in the timber resource.

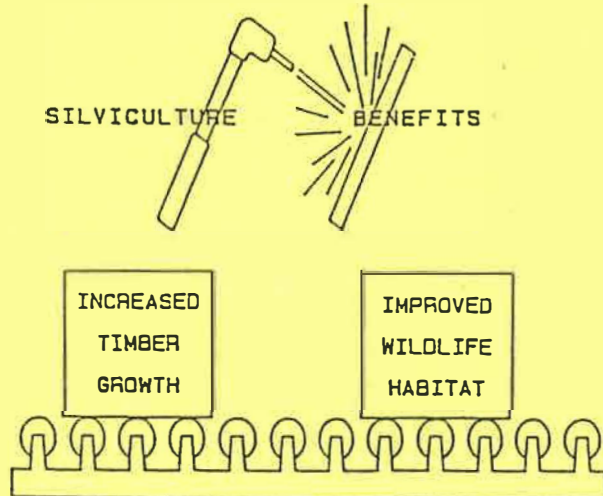
FOR
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In light of the apparent change in common landowner objectives, it is very appropriate for us to ask: "WHAT IS THE CURRENT ROLE OF SILVICULTURE ON THE PRIVATE NON-INDUSTRIAL FOREST?"

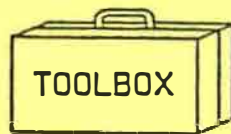
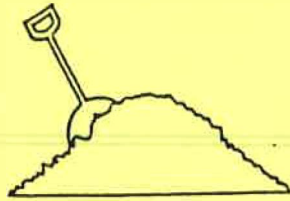
If I would have asked myself this question 15 years ago, I think my answer would have been something like this: "To grow high quality forest products." In other words, I thought of silviculture as being the art and science of growing trees to produce valuable products for marketing. There is nothing wrong with growing trees for profit, and in many cases, once landowners are aware of their resource and the opportunities for managing it, that will be an important objective for many. However, we must realize that benefits are not limited to the traditional timber products that may be sold to provide income for landowners, jobs for people, and products for consumers.

Can silvicultural techniques be used to accomplish wildlife management and aesthetic objectives on small woodlots? Yes, but because the size of the acreage you are able to influence is so small, management for these objectives must be more intense than on larger ownerships. You must look within the stand for actions you can take to increase production of benefits, rather than producing benefits from many stands spread over a large area. Seldom will you be able to create a wide range of age and type classes, or vistas that provide a broad view of the ownership.



I define silviculture as the theory and practice of controlling the establishment, composition, growth, and quality of a forest stand to meet ownership objectives. In other words, silviculture is a tool that can be used to produce benefits for the landowner, and for the community (Mills, 1987). In the past, the principle focus of silvicultural research has been timber production. However, silviculture involves the manipulation of forest stands to achieve the varied objectives of forest landowners.

I want to stress that the current role of silviculture I am speaking of is to do more than just produce benefits as a spin-off of our accomplishment of a timber crop production objective. I am saying we need to have silvicultural knowledge, and application skills that enable us to produce these benefits when wildlife and aesthetics are primary objectives, not just by-products.



Much of the knowledge we need is available; it is just buried and unused. We need to dig it out and put it in our tool box so it will be at our fingertips when the time is right for using it. Much of this information can be obtained from our counterparts in the related resource fields (i.e., wildlife biologists and landscape architects). Once we have acquired the knowledge, and know when and how to use it, we must then sell our potential clients on our ability to accomplish their objectives. That selling task will probably be the most difficult part of the whole job.

When wildlife and aesthetics are the primary objectives, timber management will often provide the vital means to accomplishing the end. I am not saying this will always be the case, but when it is, we need to be responsive and concentrate on producing benefits consistent with landowner objectives.

Following are a few specific areas of aesthetic and wildlife management which can be effectively influenced with silvicultural techniques:

1. the quantity and variety of mast produced;
2. the quantity and quality of dens;
3. the quantity of available browse;
4. the variety of wildlife species within a stand;
5. the number of trees with unique or distinctive shape;
6. the size of trees;
7. the preservation of "special" trees which landowners may indicate a sentimental attachment to;
8. the variety of trees within a stand;
9. the atmosphere of the woods (type and density of both overstory and understory vegetation);
10. the color of foliage in the fall;
11. the amount of slash on the ground; and
12. the susceptibility of the stand to damage by insects and disease, and vulnerability to mortality.

So far, I have talked about producing benefits for private non-industrial landowners, and how we can accomplish their objectives. It is essential we do that if we are to maintain or increase our influence on the management of the private non-industrial forest. However, at least a part of the management we have accomplished in the past has been influenced by public investment on private lands.

Will this current role of silviculture meet community objectives?

Can we get public support for accomplishing the landowner's wildlife and aesthetic objectives?

Is the public willing to invest tax dollars to improve wildlife habitat and aesthetics on land they may never be able to obtain access to?

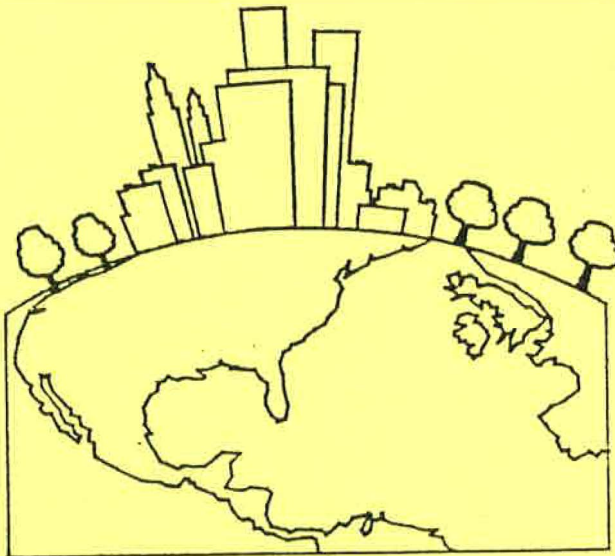
We know it is acceptable to include these objectives in management plans, and to have them as secondary objectives that do not have practice requirements in cost share programs. But, is it acceptable to have them as primary objectives in silvicultural cost share programs? At this time at the Federal level, I do not see any clear indications that it is. However, that may change in the not-too-distant future.

The recent article, "Integrated Resource Management and Private Forestry: One State's Approach" (February 1988 Journal of Forestry), indicates that the public in Wisconsin is willing to make some investment in wildlife habitat management on the private non-industrial forest. In this particular case, they were willing to make an even larger investment if the landowner would agree to open the land to public access. This example may be an indication of things to come.

An important role of silviculture relates to rural development, which is a subject that is currently in vogue in public forestry circles, especially at the National level. In the true rural areas, beyond the urban interface, silviculture is a tool that can be used to provide a means for people to make a living from farm and forest -- to sustain the rural way of life. This is not only sound economic development, but also social development, which is desired by many communities.

The best, most viable example is the instance in which we are thinning fuelwood or pulpwood from a stand, and releasing desirable crop trees that have the potential to develop into high value forest products. The current harvesting of firewood provides immediate employment and income, and the early maturity of a greater quantity of high value product provides a future boost to the local economy. Both of these economic activities are consistent with perpetuating the rural way of life.

Again, silviculture is helping to provide an alternative to urban economic development. If we are successful at using silviculture to benefit wildlife populations, and create more aesthetically desirable forests, we will also contribute to sound rural development by encouraging tourism.



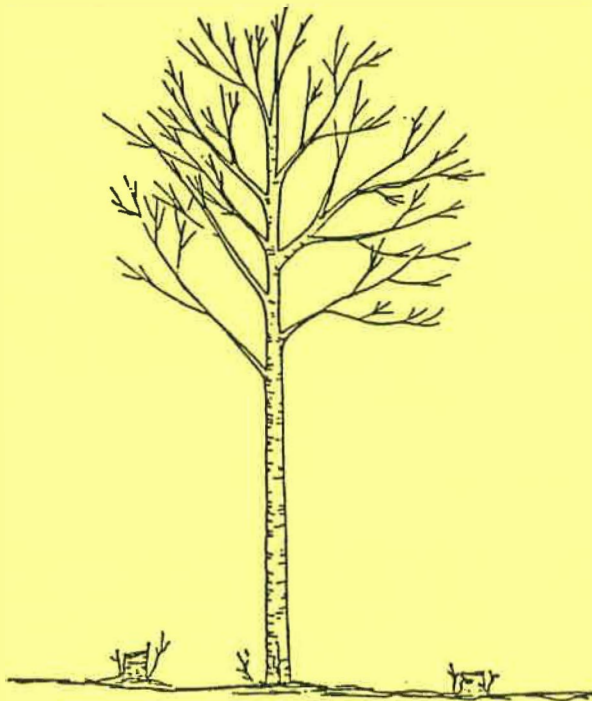
In the zones around our expanding cities, forest management cannot compete with the more economically profitable uses of the land. However, in these urban interface areas, valid silvicultural practices can help provide short-term alternatives to urban development. These residual forests provide us with an opportunity to have valuable demonstration areas that will help educate the urban public about the range of forest management opportunities. Delaying the urbanization process may provide time for communities to preserve some forestland as islands of vegetation in the sea of concrete.

SUMMARY

The current role of silviculture is to provide benefits to forestland owners and to the community. These benefits include the production of forest products that will provide landowners with income, people with jobs, and consumers with products. However, it now also has the recognized role of being the tool that can accomplish wildlife habitat and aesthetic objectives. We must have the knowledge and skill to use silvicultural techniques to accomplish non-timber as well as timber objectives. While this creates a demand for increasing our knowledge base, it also provides an opportunity for some very interesting challenges.

CROP TREE RELEASE --- HOW WELL HAVE WE DONE?
by Arlyn W. Perkey

When marking timber, do you select the best crop trees in the stand and release them? Many foresters say they do, especially when marking woodlots for firewood or other relatively low value uses. Many stands managed with both even-aged and uneven-aged systems are cut to a residual basal area of approximately 60 to 80 square feet/acre. If we mark to these levels without really focusing our attention on releasing the most valuable crop trees, then how much release do these trees receive?



A free-to-grow rating (0, 1, 2, 3, or 4) can be used to describe the degree of release that each crop tree receives. A "0" rating means that the crown is not free to grow on any of its four sides (or quadrants). A rating of "4" means it is free to grow on all four sides. Free-to-grow means there is a space of at least 10 feet between the crown of the crop tree and the crown of an adjacent competitor. Each of the four sides needs to be evaluated individually to arrive at a free-to-grow rating.

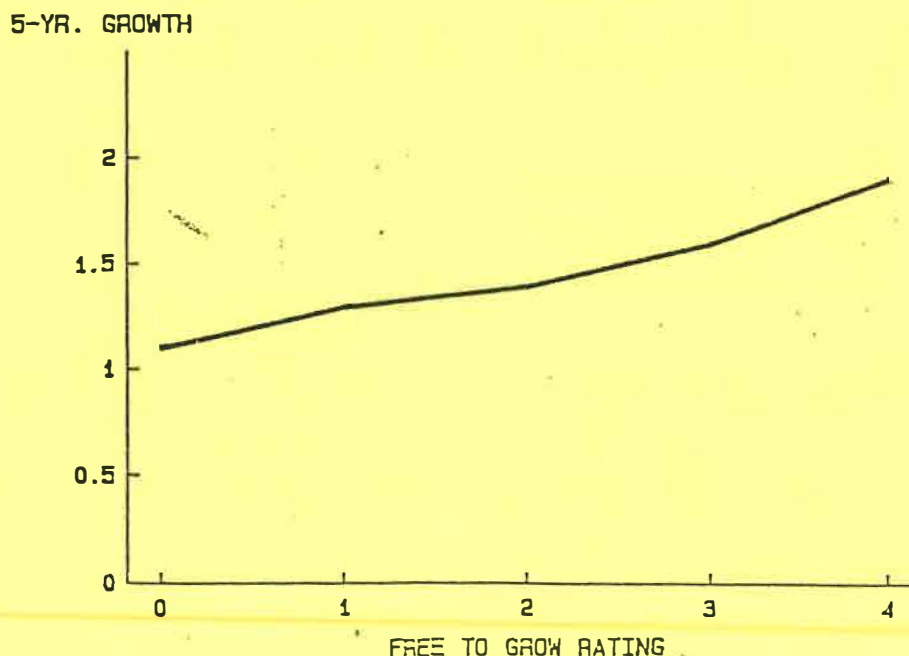
The above rating system was used recently to evaluate stands thinned through the ACP Fuelwood Project in New England. Under that project, prescriptions were made using the appropriate stocking charts for the forest type. Most of the harvesting was performed with small equipment; therefore, very little logging damage occurred within the residual stand. The guidelines for the Fuelwood Practice placed no special emphasis on doing crop tree release, beyond what direction is found in the appropriate silvicultural guide for the forest type. Most of the cutting was completed during the period of 1982-1985. These stands, which are an excellent example of area-wide thinning, provided a good opportunity to evaluate how well we released the best crop trees with commonly applied even-aged thinning techniques.

During the evaluation, attention was focused on the best 20 crop trees per acre. For many of the stands we were working in, that included all of the trees with high potential for producing income during the next 20-year period. Eight stands in Massachusetts and Vermont were examined, and a total of 64 crop trees were given a free-to-grow rating. The stand basal areas ranged from 50 to 90 square feet per acre. The average free-to-grow rating for the 64 crop trees was 1.75. That means the average crop tree was free-to-grow on 1.75 sides, or around approximately 44 percent of its crown perimeter. The variation in average crop tree free-to-grow status ranged from a low of 1.1 to a high of 2.9. Is that good or bad?

I compared the preceding results with free-to-grow ratings for crop trees found on five research plots thinned to 60 percent stocking five years previously. The average free-to-grow rating for the 20 best crop trees per acre was 2.1. With regard to degree of crop tree release, relatively little difference exists between the research thinning and the practical application of the stocking chart prescriptions. However, this still does not indicate the amount of growth potential captured by those 20 best crop trees per acre in the area-wide thinning. In other words, are we losing significant growth potential by releasing our most valuable crop trees on only 1.75 sides instead of on 3 or 4 sides?

All of the trees in the research growth study were measured 5 years ago (1982). The 20 best crop trees per acre (a total of 200 trees) were remeasured after the end of the 1987 growing season and assigned a free-to-grow rating. The following graph depicts the relationship between the average free-to-grow rating and the average 5-year growth.

RELATIONSHIP OF 5-YR. GROWTH
TO FREEDOM TO GROW
(DBH Growth in Inches)



We could achieve greater growth on our most valuable crop trees if we would provide a more complete release. So why are we not doing it? My speculations are as follows:

1. We have not given sufficient attention to adequately releasing the most important crop trees. In the past, we have assumed that if we reduced the stand basal area to 70 square feet, the appropriate distribution of the cut would happen automatically. This is not necessarily true, in fact, very frequently it does not happen. There are examples of good unreleased crop trees in stands with basal areas of 50 square feet.
2. We do not look up enough. When marking rapidly to maintain a high production rate, it is easy to get into the habit of looking at eye level, or just to the top of the first two logs. Many foresters go through the stand and mark the trees with the poorest boles. To do a good job of crop tree release, you must look up into the crowns and select trees to remain from those having good healthy crowns. Then you mark for removal those trees with crowns inhibiting the expansion of the selected crop trees. If you are not stumbling over limbs and brush on the forest floor, you probably are not looking up enough.
3. There is some worry that if we over-expose our crop trees they will degrade due to epicormic branching. This is a valid concern if the crop trees have poor or fair crowns, and are a species with strong tendency toward epicormic branching. In most situations, that potential problem can be averted by selecting crop trees from the dominant/codominant crown classes with good, full crowns, and by avoiding trees that currently have visible buds on the lower stem, or show signs of previous epicormic branching.
4. If the stand is cut too heavily, volume growth will be lost. Recent studies indicate that stands may be reduced to 40 percent stocking without sacrificing volume growth loss. However, even if we do lose some growth, if it occurs on relatively low value trees, it is not very important to most private non-industrial landowners. The crop trees are the benefit producers; so it is more important to do what is best for them.

Vermont may submit a request for a special cost share practice to perform crop tree release in pole and small sawtimber stands. There is interest in West Virginia for a similar project.

A tally sheet and associated instructions are available to facilitate estimating the number of crop trees per acre and evaluating their free-to-grow status. If you would like a copy of this tally sheet, designed for use with 1/5th acre plots, please feel free to request it from me. Use it in some of the stands you have marked, and see how thoroughly you released your highest value 20 trees per acre. When you are evaluating the free-to-grow status of crop trees, you need to be tough and make sure the crowns are free to expand, not just survive. You may be surprised to find there is a potential to have a much more favorable distribution of growth on the highest value crop trees.

The last issue of Forest Management Update included a sample letter to a landowner explaining the benefits of culturing crop trees in commercially operable stands. I asked for feedback from you to see if you thought it was a good example of effective communication to landowners. Many of you said it was, but others commented that the letter was still too technical. I asked Brenda Wilkins to simplify the letter and provide a version that is easier for folks to understand. Here is her revision for your consideration.

July 29, 1988

Oscar Owner
1 Woodland Road
Treeland, USA

Dear Oscar,

I enjoyed looking over your 16-acre woodlot with you last week. As I said then, there are a few things we can do to make your trees work for you. This letter explains how we can get what you told me you want from your property.

First, since you'd like to see more squirrels and wild turkeys in your woods, we have to get those oaks and black cherry trees to produce more food for them. The way to do this is to pick out the best ones and give them more room to grow by taking out some of the trees that are crowding them. We also need to make sure there are some good den trees to provide shelter for wildlife. If there are not enough den trees on the property now, we can look for some that can become future homes for wildlife.

Second, because you enjoy the fall colors, we should keep the nicest red maple trees along the walking trail, and remove some of the other trees that are squeezing the maples out. Once the maples get some growing space, they will fill out and add even more color to your fall landscape.

Last, to get a good profit from selling some of your trees in about 15 years, we need to get as much growth as possible on those selected trees. I remember you said you want to keep many of the big trees in the area nearest the trail. We can do that and still have many good, large trees for harvesting.

Oscar Owner - July 29, 1988
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From the information I gathered during my visit, I can tell you that in order to get what you want from your woodlot, we need to open it up some right now. This means cutting certain trees to give others room to grow. We can do this with a timber sale that would bring you about \$4,800 (\$300 per acre) at this time. I would mark the trees to be cut, and only those that need to be removed would actually be taken out.

If we do as I am suggesting, you could receive about \$400 more per acre for the timber trees you sell in 15 years. This means you can expect to earn approximately \$22,000 from the sale of your trees at that time. If you do nothing, your trees will probably be worth about \$16,000 at the end of the 15-year period.

There are a couple other things I'd like to ask you to think about:

(1) If you decide to proceed with the timber sale I have recommended, it would be a good opportunity to also harvest all the trees on the one-acre patch I pointed out to you last week. Since there are so many young oak seedlings thriving in that area, we could give this valuable new growth a better chance of developing if the other trees are cut.

(2) The two-acre area we looked at where many of the trees are in pretty poor condition could be treated now to help get new growth started in that area. There are not enough seedlings there right now to permit us to harvest all of the trees as with the one-acre patch. But, if we kill some of the small, undesirable plants that are choking out the little oaks, the better trees could then produce seedlings that should be able to survive. The cost of treating this two-acre area would be about \$100. If we are successful and new growth becomes established as a result of the treatment, the large trees that we leave in that area now can be harvested in 15 years.

If you have questions about the work I am suggesting we do on your woodlot, please get in touch with me and we will get together to discuss it further.

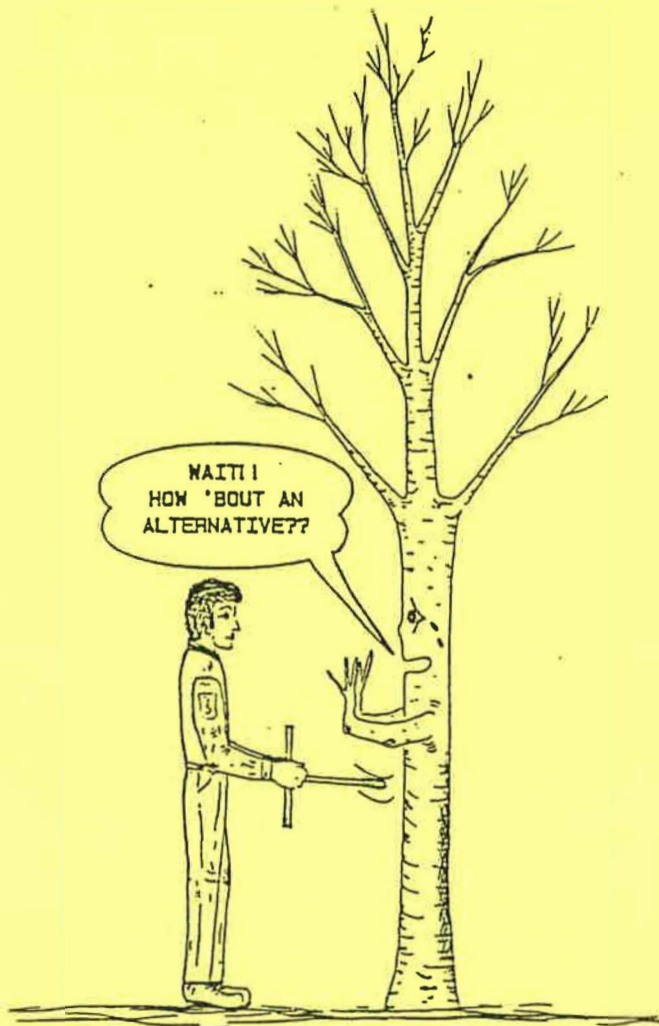
Sincerely,

Fred

Fred Forrester

THE BORING ALTERNATIVE by Arlyn W. Perkey

Are you frustrated trying to evaluate site productivity using age and height to measure site index? If you have had increment borers break in oak trees, or spent time twisting and turning only to find that you missed the center, or the rings were unreadable, or even worse, the borer was not quite long enough, read on.



If the species you are using to evaluate the productivity of the site are red oak, yellow poplar, black cherry, sugar maple, or red maple, you may have an alternative worth considering. Neil Lamson, Research Forester with the Northeastern Forest Experiment Station in Parsons, West Virginia, has developed a chart that classifies sites using the DBH of dominant and codominant trees and total tree height. You may need to measure a few more trees in each stand, but that could be easier than boring, and the results may be satisfactory for your needs. The method is used to estimate the site to the nearest 10-foot site index class, but for many purposes, that may be sufficient. Since the data base is on fairly productive sites in West Virginia, the range of site classes is from 60-80, at base age 50. The data base trees are all within 25 miles of Parsons, WV.

A trial application of the system was made near Morgantown, West Virginia. Twenty-six trees were measured in eight stands. The method was easy to use, and when the estimated site index class was compared to the measured site index for that tree, the estimate was correct 16 out of 26 times. Since it is essential that more than one tree be measured in each stand, the accuracy needs to be evaluated for the stand, as well as on individual trees. Five of the eight stands would clearly have been classified correctly. Classification for two of the stands was uncertain (half the trees in one class, half in another), and one of them would have been misclassified.

Most of the misclassification was with yellow poplar. In fact, in the trial application, seven of the eight yellow poplar trees evaluated were misclassified. This accounted for seven of the ten tree misclassifications, and the one definite stand misclassification. Our trial application did not include any sugar maple.

If the five species listed in the following chart are important in your area, you may want to try this technique of evaluating site productivity to see if it is accurate enough to meet your objectives. If it works for you, there is an opportunity to save time and frustration.

Estimated total height of dominant and codominant trees
by diameter class, species, and northern red oak SI class

D.b.h. class (inches)	Red oak			Yellow- poplar		Black cherry			Sugar maple		Red maple		
	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI	SI
	60	70	80	70	80	60	70	80	70	80	60	70	80
	-----Feet-----												
4	38	37	41	36	39	39	37	38	37	38	37	40	37
6	49	49	51	49	53	50	50	52	49	50	47	52	50
8	57	59	65	60	66	58	60	63	59	61	55	62	61
10	64	66	74	70	77	64	69	73	67	70	61	69	72
12	69	72	82	79	86	68	76	82	73	77	66	75	80
14	72	77	88	86	94	71	83	89	79	84	69	79	88
16	75	81	93	92	102	74	88	95	83	89	72	82	95
18	77	85	97	98	108	76	92	101	87	93	74	85	101
20	79	87	101	103	114	77	96	105	90	97	75	87	107
22	80	89	103	107	118	78	99	109	92	100	76	88	111
24	81	91	106	110	123	79	101	113	94	103	77	90	115
26	82	92	108	113	126	79	103	115	96	105	78	90	119
28	83	93	109	116	130	80	105	118	97	107	78	91	122
30	83	94	110	119	133	80	106	120	98	109	79	92	125

SOURCE: Estimating Northern Red Oak Site-Index Class from Total Height and Diameter of Dominant and Codominant Trees in Central Appalachian Hardwood Stands, NE-RP-605, by Neil I. Lamson.

Example

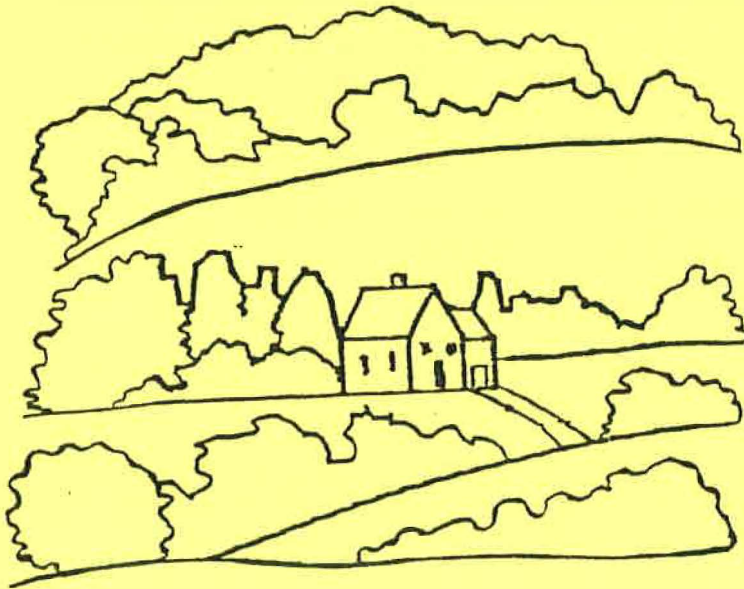
Site Tree	
Species	DBH
Red Maple	14"
	Measured Height
	78'

Red Oak Site Class: 70

**** GOODIES FROM THE GREEN MOUNTAIN STATE ****

Take A Plot

Vermont Department of Forests, Parks, & Recreation has recently initiated an innovative educational outreach for forest landowners called TAKE A PLOT.



An eye-catching kit is provided to each landowner who wants to establish a plot, or plots, to help monitor forest health by recording growth and describing any changes in the apparent vigor of trees on the plot. This information is then sent into a central office where it can be summarized and analyzed. While the scientific reliability of the information may be questionable, it is a good technique to increase landowner awareness of the changes that occur in their forests. Hopefully, this will spark, or feed, an interest in managing the forest to influence these changes.

Deer Yard Management

Foresters and wildlife biologists in Vermont have put their heads together and written "Management Standards for Deer Wintering Areas On Use Value Appraisal Properties." This document provides valuable guidance for the management of critical deer cover on much of the private land in Vermont. Foresters in other northern states who manage the spruce-fir forest type for wood and deer habitat will find this document worth reading.

Both of the above may be obtained by contacting:

Conrad M. Motyka
State Forester
Department of Forests, Parks & Recreation
Waterbury State Complex
103 South Main Street
Waterbury, VT 05676

TREECALC

TREECALC is a computer program that calculates the volume and value of individual trees. The user inputs species and diameter of the tree, and optional characteristics like height, form class, grade, and product value.

I found the program very helpful for placing a current dollar value on individual timber crop trees, and estimating their future value with and without release. Since this program was developed as part of the SILVAH program, it contains data for the same species recognized by SILVAH. It is written in Fortran, requires 256K of memory, and an MS-DOS operating system. For additional information or a copy of the program, contact:

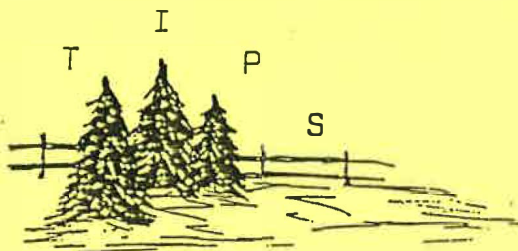
Northeastern Forest Experiment Station
Forestry Sciences Laboratory
P. O. Box 928
Warren, PA 16365

FORESTER'S TOOLKIT

FORESTER'S TOOLKIT, prepared by Dr. Harry V. Wiant, Jr., Professor of Forestry at WVU in Morgantown, WV, is a handy collection of MS-DOS computer programs consisting of eight diskettes which contain the following:

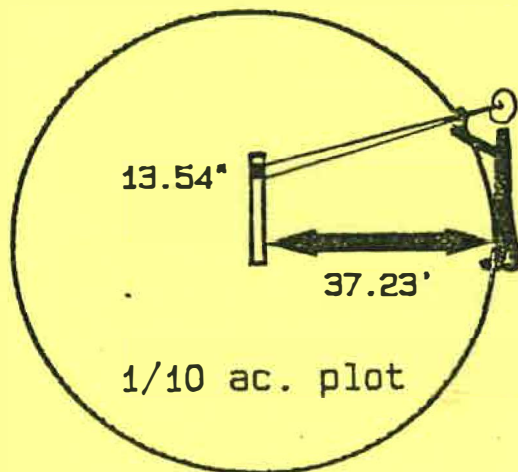
<u>Disk Name</u>	<u>Description</u>
PROCOMM 2.4.2 INVENTORY	Communication package OPTIMUM.EXE - finds optimum plot size or BAF STUMP.EXE - finds DBH from stump measurements for most eastern species CRUISE.EXE, CRUISE.BAS, CRUISER.BAS - inventory programs
LOCAL	LOCAL.COM, LOCAL.PAS - creates local volume with graphics DOUBLE.COM, DOUBLE.PAS - doubling sample cruise program
STAT	CURVEFIT.BAS - curve-fitting program QUIKSTAT.EXE - Simple statistical programs
MENSI	MENSI.COM - a self-instruction course in mensuration
TWAGE	A growth projection program GROAK.BAS - growth projection for oaks
EPISTAT	Statistical analyses programs (requires GW BASIC)
ITMAP	A surveying program

To obtain this package, send 8 blank (unformatted) 5-1/4" diskettes to me in a returnable mailer and include a self addressed mailing label. If you want only a portion of the package, send the appropriate number of disks and indicate your choices. We will copy the programs onto your diskettes and return them to you; however, any questions you may have regarding use of the programs should be directed to Dr. Wiant at 338 Percival Hall, West Virginia University, Morgantown, WV 26506.



This section of the Update was initially set aside for passing along tips to the backyard silviculturist. However, we've found that our readers could be better served by expanding the subject area for pointers offered. For this reason, we decided to change things beginning with this issue. From now on, this section will include information concerning all aspects of forestry. As before, we welcome your input, and hope you will use this portion of our newsletter as a means of sharing with others.

TIP #5:



Plot Size (ac.)	Plot Radius	Target Size (10 BAF)
.2	52.66'	19.15"
.1	37.23'	13.54"
.05	26.33'	9.58"

Recently, there has been renewed interest in using fixed-radius plots in forest inventory. Here is an old plot boundary establishment technique that we recently discovered many foresters are not familiar with. It can frequently increase the efficiency of cruising by reducing the amount of time needed to locate the plot boundaries. The plot radius may occasionally need to be measured with a tape to check borderline trees, but in many stands with relatively few trees per acre, this method may be worth trying.

Take a Jacob staff, broom handle (sharpen one end to a point), or other similar object, and identify on it the measured target for the size of fixed-radius plot and the factor angle gauge (or prism) you are working with. The target can be painted on or marked by wrapping the pole with brightly colored tape or flagging. Leave a little bare space at the top of the pole when measuring and marking your target so that you will be better able to see the whole target clearly at a distance.

Stick the pole in the ground at plot center and pace the distance to locate the approximate plot boundary. Fine tune the boundary location by holding the angle gauge sideways and sitting on the target at plot center. When the target and angle gauge are aligned, you are at the proper radial distance. Walk in a circle around plot center, periodically using the angle gauge to confirm that you are at the appropriate distance from center as you traverse the perimeter of the plot.

The above diagram illustrates this technique using an example of a one-tenth acre plot with a radius of 37.23 feet and a target size of 13.54 inches. Measurements for other plot sizes and basal area factors can be obtained from appropriate limiting distance tables for the BAF you choose to use.



We invite participation in the development of future issues of FOREST MANAGEMENT UPDATE. The intent of this periodical is to provide a means of technical communication for professional foresters managing the private non-industrial forests in the Northeastern Area. The majority of articles printed in the Update address technical forestry subjects of interest to readers in a reasonably broad geographic area. If any of our subscribers would like to submit articles for publication, please feel free to contact me at the address and phone number listed below.

FOREST MANAGEMENT UPDATE

<< A TECHNOLOGY TRANSFER PERIODICAL >>

BY
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